

AD-A144 745

NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS
NYSTROM POND DAM (CT.) (U) CORPS OF ENGINEERS WALTHAM MA
NEW ENGLAND DIV JUN 80

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UNCLASSIFIED

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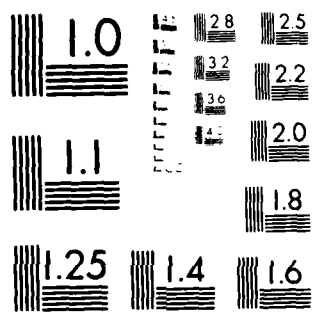
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AD-A144 745

NYSTROM POND DAM
CT 00457

NAUGATUCK RIVER BASIN
LITCHFIELD, CONNECTICUT

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PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

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REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER CT 00457	2. GOVT ACCESSION NO. AD-A144745	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) Nystrom Pond Dam NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS		5. TYPE OF REPORT & PERIOD COVERED INSPECTION REPORT
7. AUTHOR(s) U.S. ARMY CORPS OF ENGINEERS NEW ENGLAND DIVISION		6. PERFORMING ORG. REPORT NUMBER
9. PERFORMING ORGANIZATION NAME AND ADDRESS		8. CONTRACT OR GRANT NUMBER(s)
11. CONTROLLING OFFICE NAME AND ADDRESS DEPT. OF THE ARMY, CORPS OF ENGINEERS NEW ENGLAND DIVISION, NEDED 424 TRAPELO ROAD, WALTHAM, MA. 02254		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)		12. REPORT DATE June 1980
		13. NUMBER OF PAGES 45
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18. SUPPLEMENTARY NOTES Cover program reads: Phase I Inspection Report, National Dam Inspection Program; however, the official title of the program is: National Program for Inspection of Non-Federal Dams; use cover date for date of report.		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) DAMS, INSPECTION, DAM SAFETY, Naugatuck River Basin Litchfield, Connecticut		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) The Nystrom Pond Dam consists of a concrete, stone masonry and earth structure with a total length of 104 feet and a maximum height of 15 feet. The main dam appears to be in fair condition and requires some work. The dike is in poor condition with very little freeboard or top width is in some areas. In accordance with the Corps of Engineers' <u>Recommended Guidelines for Safety Inspection of Dams</u> the Nystrom Pond Dam is classified as "Small" in size based on storage capacity. Therefore, the dam is classified as "Low" potential hazard.		

ROALD HAESTAD, INC.
CONSULTING ENGINEERS

37 Brookside Road • Waterbury, Conn. 06708 • Tel. 203 753-9800

May 30, 1980

The Department of the Army
New England Division
Corps of Engineers
424 Trapelo Road
Waltham, Massachusetts 02154

Attention: E. P. Gould
Project Management Division

Re: Nystrom Pond Dam
Litchfield, Connecticut

Gentlemen:

Following field surveys and a dam failure analysis of Nystrom Pond Dam, we conclude that the dam should be reclassified as having a low hazard potential.

We are enclosing a brief letter report substantiating our findings.



Very truly yours,
ROALD HAESTAD, INC.

By *Roald Haestad*
Roald Haestad

RH:cft
Encl.

Accession For	
NTIS GRA&I	<input checked="checked" type="checkbox"/>
DTIC TAB	<input type="checkbox"/>
Unannounced	<input type="checkbox"/>
Justification	
By _____	
Distribution/	
Availability Codes	
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AI	



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DESCRIPTION

NYSTROM POND DAM

CT 00457

TOWN OF LITCHFIELD, COUNTY OF LITCHFIELD

ON TURNER BROOK

OWNED AND OPERATED BY THE STATE OF CONNECTICUT,
DEPARTMENT OF ENVIRONMENTAL PROTECTION

The Nystrom Pond Dam consists of a concrete, stone masonry and earth structure with a total length of 104 feet and a maximum height of 15 feet. The dam was originally constructed as a stone masonry wall with an upstream earth embankment. The concrete portion of the dam was constructed on and against the downstream face of the stone masonry wall in 1963. In 1969, the dam was raised approximately 2 feet and timber flashboards were replaced by a concrete wier. A downstream earth embankment is present against the left end of the dam. A 20 foot wide overflow spillway is located near the right side of the dam. The outlet works located at the left end of the spillway consist of a 12-inch cast iron pipe through the dam controlled by an upstream gate.

A 3 foot high earth and stone masonry dike is located approximately 500 feet south of the main dam on the west side of the pond. See location plan, page 4.

The dam is owned and operated by the State of Connecticut, Department of Environmental Protection. The dam impounds Nystrom Pond, a portion of Nystrom State Park, and is used for fishing and swimming.

The main dam appears to be in fair condition and requires some work. The dike is in poor condition with very little free-board or top width in some areas. The top of the dike is 2.5 feet lower than the crest of the d-

EVALUATION OF HYDRAULIC/HYDROLOGIC FEATURES

The Nystrom Pond Dam has a tributary watershed of 0.19 square miles, and a water surface area and storage capacity at spillway level of 17.4 Acres and 130 Acre-Feet respectively. The storage capacity with the water level at the crest of the dam would be 193 Acre-Feet.

The spillway has a capacity of 60 cfs before overtopping the dike and 390 cfs at the crest of the dam. In accordance with the Corps of Engineers' Recommended Guidelines for Safety Inspection of Dams, the Nystrom Pond Dam is classified as "Small" in size based on storage capacity.

Plans for the 1963 reconstruction, As-Built plans for raising the dam and spillway calculations for a 100-Year Flood are available. See List of References, Appendix A.

A dam breach analysis was made using the Corps of Engineers' "Rule of Thumb" guidance for estimating downstream dam failure hydrographs. Failure was assumed with the water level at the top of the dam. This is a conservative assumption as the dike is 2.5 feet lower and would be overtopped, preventing the water level from reaching the top of the dam. The peak discharge from the dam breach was calculated to be 4,100 cfs. The flood waters were routed through the downstream reaches.

The flood waters would overtop Moosehorn Road and Northfield Road by about 5 feet and Connecticut Route 254 by about 2 feet, before being dissipated behind the Northfield Brook Flood Control Dam. The waters would also flood cellars in a few homes. Loss of life from a failure of Nystrom Pond is unlikely. Therefore, the dam is classified as "Low" potential hazard. See Appendix C for calculations and Figure 3, page C-17 for the Limits of Potential Flooding.



OVERVIEW PHOTO

U S ARMY ENGINEER DIV NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASSACHUSETTS

ROALD HAESTAD, INC
CONSULTING ENGINEERS
WATERBURY, CONNECTICUT

NATIONAL PROGRAM OF
INSPECTION OF
NON-FED. DAMS

NYSTROM POND DAM - CT 00457

TURNER BROOK

LITCHFIELD, CONNECTICUT DATE: 10 APRIL 1960

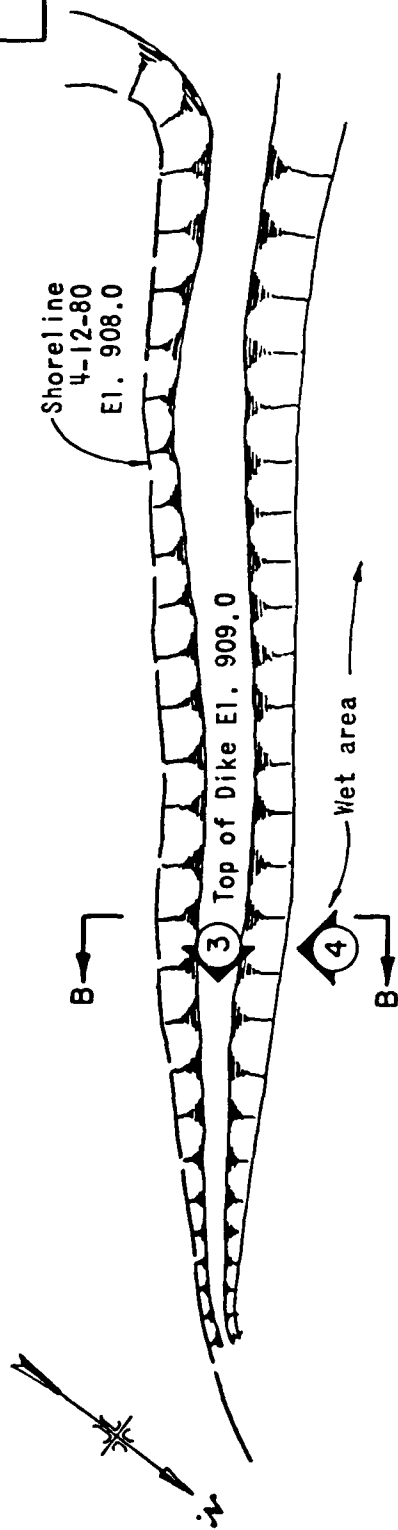
Appendix A
Engineering Data

LIST OF REFERENCES

References are located at the Department of Environmental Protection, Office of the Superintendent of Dams, State Office Building, Hartford, Connecticut, 06115.

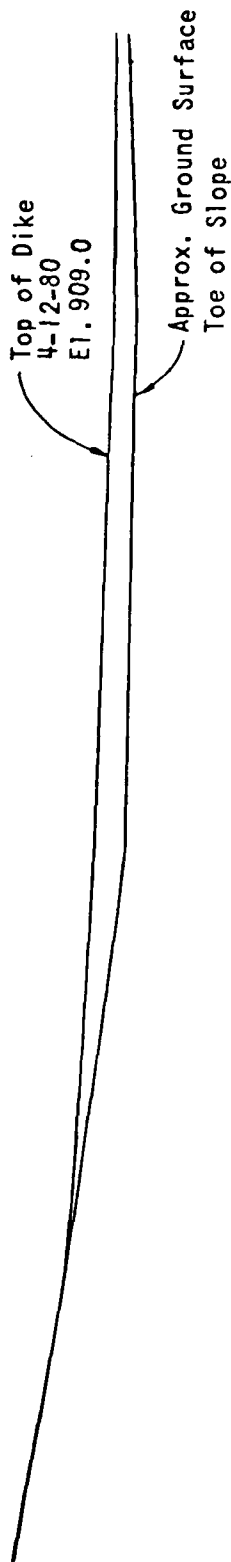
- 1) Plan, "Connecticut State Park and Forest Commission, Nystrom Pond, Northfield, Connecticut, Dam Repairs" C. H. Nickerson and Company, Incorporated, March 19, 1962.
- 2) As-Built Drawing "State of Connecticut Public Works Department, Raise Height of Dam, Nystrom State Park, Thomaston, Connecticut", Charles P. Hurley, Consulting Engineer, Winsted, Connecticut, July 1968. (As-Built, January 1, 1970)
- 3) Flood Flow Computations for 100-Year Storm.
- 4) Miscellaneous correspondence on dam.

FIGURE 2A



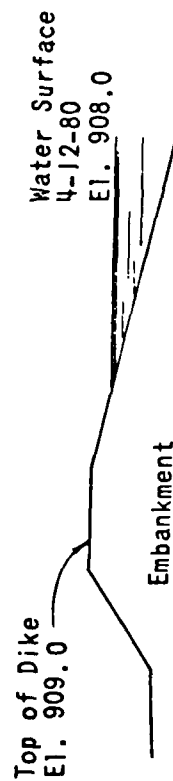
PLAN

Scale: 1" = 20'



ELEVATION

Scale: 1" = 20'



SECTION B-B

Scale: 1" = 10'



Denotes photo location and
direction in which photo was taken.

ROAD HAESTAD, INC.
CONSULTING ENGINEERS
WATERBURY, CONNECTICUT

U.S. ARMY ENGINEER DIVISION
CORPS OF ENGINEERS
WALTHAM, MASS.

NATIONAL PROGRAM OF INSPECTION OF NON-FED DAMS

NYSTROM POND DAM
DIKE

DATE	CHECKED	APPROVED	SCALE	AS NOTED
10/1/80	W. G. J.	W. G. J.	1" = 20'	1" = 10'

Appendix B

Photographs

Note: For Photo Locations,
see Figures 2 and 2-A
in Appendix A



PHOTO NO. 1

UPSTREAM SLOPE OF MAIN DAM
NOTE EROSION TO LEFT OF SPILLWAY



PHOTO NO. 2

OVERVIEW OF DAM FROM DOWNSTREAM.
NOTE EROSION ON DOWNSTREAM SLOPE

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WALTHAM, MASSACHUSETTS

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WATERBURY, CONNECTICUT

NATIONAL PROGRAM OF
INSPECTION
NON-FED. DAMS

NYSTROM POND DAM
TURNER BROOK
LITCHFIELD, CONNECTICUT
CT 00457
5 APRIL '80



PHOTO NO. 3

CREST OF DIKE.
NOTE TREE, LACK OF WIDTH AND FREEBOARD



PHOTO NO. 4*

DIKE FROM DOWNSTREAM

*12 APRIL '80

U.S. ARMY ENGINEER DIV NEW ENGLAND
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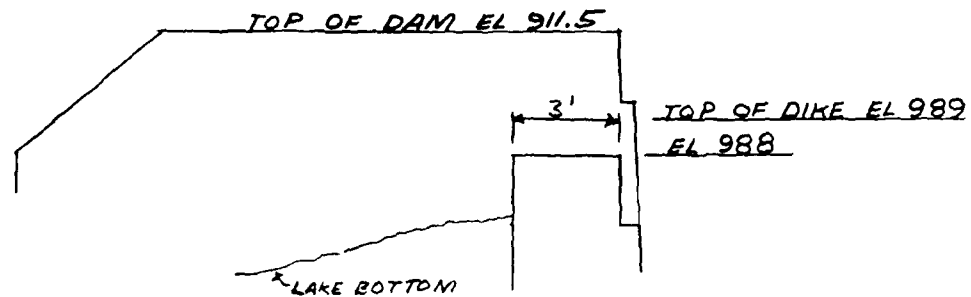
NYSTROM POND DAM
TURNER BROOK
LITCHFIELD, CONNECTICUT

CT 00437

5 APR 80

Appendix C
Hydraulic/Hydrologic Computations

BY...SAL...DATE 5/9/80... ROALD HAESTAD, INC. SHEET NO.....1.....OF 16.....
CONSULTING ENGINEERS
CKD BY...DLC...DATE 5/9/80... 37 Brookside Road - Waterbury, Conn. 06708 JOB NO...049-24...
SUBJECT...MYSTROM POND DAM - Spillway Capacity.....



SPILLWAY SECTION

Length of Spillway is 20 feet.

Spillway discharge coefficient = 2.97 (Broad Crested Weir
with a width of 3 ft)

$$\begin{aligned} \text{Spillway Discharge Capacity} &= CLH^{3/2} \\ &\text{(Top of Dike)} \\ &= 2.97(20)(1)^{3/2} \\ &= 59.4 \text{ use } 60 \text{ cfs} \end{aligned}$$

$$\begin{aligned} \text{Spillway Discharge Capacity} &= CLH^{3/2} \\ &\text{(Top of Dam)} \\ &= (2.97)(20)(3.5)^{3/2} \\ &= 388.9 \text{ use } 390 \text{ cfs} \end{aligned}$$

BY...SA4...DATE 5/8/80... **ROALD HAESTAD, INC.** SHEET NO...2...OF 16...
CONSULTING ENGINEERS
CKD BY DLG DATE 5/9/80 37 Brookside Road - Waterbury, Conn. 06708 JOB NO...Q49-24...
SUBJECT NYSTROM POND DAM - Dam Breach.....

$S = \text{Storage at time of failure} = \text{Storage at spillway level} + \text{Freeboard storage}$

$$S = (17.4 \text{ acres} \times 7.6 \text{ ft}) + (17.4 \text{ acres} \times 3.5 \text{ ft})$$

$$S = 193 \text{ Ac-Ft.}$$

Note: Average depth of 7.6 ft was obtained from a State of Connecticut Fishery Survey.

$$Q_{PI} = \text{Peak Failure Outflow} = \frac{8}{27} W_b \sqrt{g} Y_o^{3/2}$$

$W_b = \text{Breach Width} = 40\% \text{ of dam length across river at mid height} = 0.4(104) = 42 \text{ ft}$

$Y_o = \text{Total height from river bed to pool level at time of failure} = 15'$

$$Q_{PI} = \frac{8}{27} (42)(\sqrt{32.2})(15)^{3/2} = 4,102 \text{ use } 4,100 \text{ cfs}$$

BY SAL..... DATE 5/19/80.. **ROALD HAESTAD, INC.** SHEET NO 3 OF 16.....
CONSULTING ENGINEERS
CKD BY DLS DATE 5/19/80.. 37 Brookside Road - Waterbury, Conn. 06708 JOB NO 49-024.....
SUBJECT NYSTROM POND DAM - Flood Routing.....

SECTION NUMBER 1

H	W	A	R	S	V	Q
1.0	145	73	.50	.0025	.47	34
2.0	290	290	1.00	.0025	.74	215
3.0	321	525	1.86	.0025	1.12	668
4.0	351	931	2.65	.0025	1.42	1325
5.0	382	1296	3.40	.0025	1.68	2177
6.0	461	1725	3.74	.0025	1.79	3007
7.0	524	2217	4.23	.0025	1.94	4308
8.0	588	2772	4.72	.0025	2.09	5790
9.0	651	3391	5.21	.0025	2.23	7571
10.0	714	4073	5.70	.0025	2.37	9659

MANNING COEFFICIENT=N=.1000
STORAGE AT TIME OF FAILURE=S= 193 AC. FT.
LENGHT OF REACH=L= 800 FT.

INFLOW INTO REACH=QP1= 4100 CFS
DEPTH OF FLOW=H1= 6.8 FT.
CROSS SECTIONAL AREA=A1= 2136 SQ. FT.
STORAGE IN REACH=V1= 72.4 AC. FT.

TRIAL REACH OUTFLOW=QP(TRIAL)= 2561 CFS
TRIAL DEPTH OF FLOW=H(TRIAL)= 5.5 FT.
TRIAL CROSS SECTIONAL AREA=A(TRIAL)= 1498 SQ. FT.
TRIAL STORAGE IN REACH=V(TRIAL)= 52.2 AC. FT.

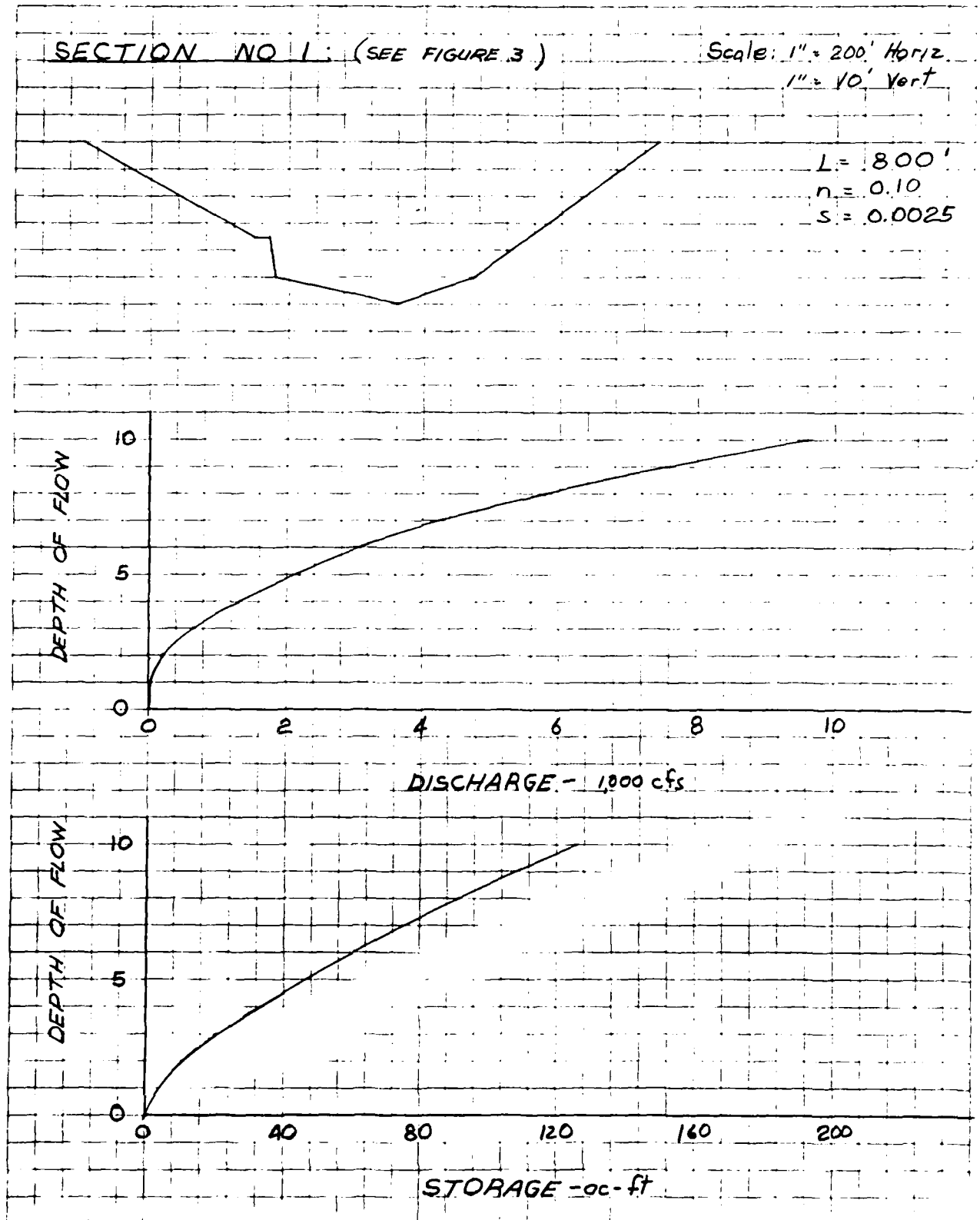
REACH OUTFLOW=QP2= 2776 CFS
DEPTH OF FLOW=H2= 5.7 FT.

Note: The Storage Capacity within the reach was
calculated from surface areas at known
Elevations. See Computation Sheet 4 of 16
and the plot on Computation Sheet 5 of 16.

BY SAL DATE 5/19/80 **ROALD HAESTAD, INC.** SHEET NO. 4 OF 16
CONSULTING ENGINEERS
CKD BY DL DATE 5/19/80 37 Brookside Road - Waterbury, Conn. 06708 JOB NO. 49-024
SUBJECT NVSTROM POND DAM - Storage Capacity - Section No. 1

Depth of Flow (ft)	Surface Area (Acres)	Average Surface Area (Acres)	Storage Capacity (Acre-ft)
0	0		0
2	10.62	5.31	10.6
4	12.50	11.56	33.7
6	14.38	13.44	60.6
8	16.27	15.33	91.3
10	18.15	17.21	125.7
12	20.03	19.09	163.9

BY SAL DATE 5/9/80 **ROALD HAESTAD, INC.** SHEET NO. 5 OF 16
CONSULTING ENGINEERS
CKD BY DLS DATE 5/15/80 37 Brookside Road - Waterbury, Conn. 06708 JOB NO. 049-24
SUBJECT N.YSTROM POND DAM - Flood Routing



BY SAL DATE 5/19/80 **ROALD HAESTAD, INC.** SHEET NO. 6 OF 16
 CONSULTING ENGINEERS
 CKD BY DL DATE 5/19/80 37 Brookside Road - Waterbury, Conn. 06708 JOB NO. 49-024
 SUBJECT NYSTRUM POND DAM - Flood Routing

SECTION NUMBER 2A
 LEFT OVBANK AND MAIN CHANNEL

H	W	A	R	S	V	Q
1.0	14	11	.79	.0360	4.83	53
2.0	18	26	1.44	.0360	7.19	185
3.0	22	44	2.00	.0360	8.95	393
4.0	26	65	2.52	.0360	10.43	602
5.0	30	90	3.00	.0360	11.79	1059
6.0	34	118	3.47	.0360	12.93	1532
7.0	37	149	4.08	.0360	14.40	2145
8.0	39	180	4.65	.0360	15.71	2832
9.0	42	212	5.01	.0360	16.52	3510
10.0	48	249	5.16	.0360	16.85	4190

MANNING COEFFICIENT=N=.0500

SECTION NUMBER 2B
 RIGHT OVBANK

H	W	A	R	S	V	Q
.9	71	39	.54	.0360	3.74	144
1.9	75	110	1.47	.0360	7.30	803
2.9	78	184	2.35	.0360	9.97	1832
3.9	82	260	3.18	.0360	12.20	3168

MANNING COEFFICIENT=N=.0500

BY SAL DATE 5/19/80 **ROALD HAESTAD, INC.** SHEET NO. 7 OF 16
CONSULTING ENGINEERS
CKD BY DLS DATE 5/19/80 37 Brookside Road - Waterbury, Conn. 06708 JOB NO. 49-024
SUBJECT NYSTRUM POND DAM - Flood Routing

SECTION NUMBER 2

TOTAL

H	A-1	A-2	A-T	Q-1	Q-2	Q-T
1.0	11	0	11	53	0	53
2.0	26	0	26	185	0	185
3.0	44	0	44	393	0	393
4.0	65	0	65	682	0	682
5.0	90	0	90	1059	0	1059
6.0	118	0	118	1532	0	1532
7.0	149	39	188	2145	144	2289
8.0	180	110	290	2832	603	3635
9.0	212	184	396	3510	1832	5342
10.0	249	260	508	4190	3168	7358

STORAGE AT TIME OF FAILURE=S= 193 AC. FT.
LENGHT OF REACH=L= 810 FT.

INFLOW INTO REACH=Q_{P1}= 2776 CFS
DEPTH OF FLOW=H₁= 7.4 FT.
CROSS SECTIONAL AREA=A₁= 229 SQ. FT.
STORAGE IN REACH=V₁= 4.3 AC. FT.

TRIAL REACH OUTFLOW=Q_P(TRIAL)= 2715 CFS
TRIAL DEPTH OF FLOW=H(TRIAL)= 7.4 FT.
TRIAL CROSS SECTIONAL AREA=A(TRIAL)= 224 SQ. FT.
TRIAL STORAGE IN REACH=V(TRIAL)= 4.2 AC. FT.

REACH OUTFLOW=Q_{P2}= 2715 CFS
DEPTH OF FLOW=H₂= 7.4 FT.

BY S.A.H. DATE 4/14/80

ROALD HAESTAD, INC.

SHEET NO. 8 OF 16

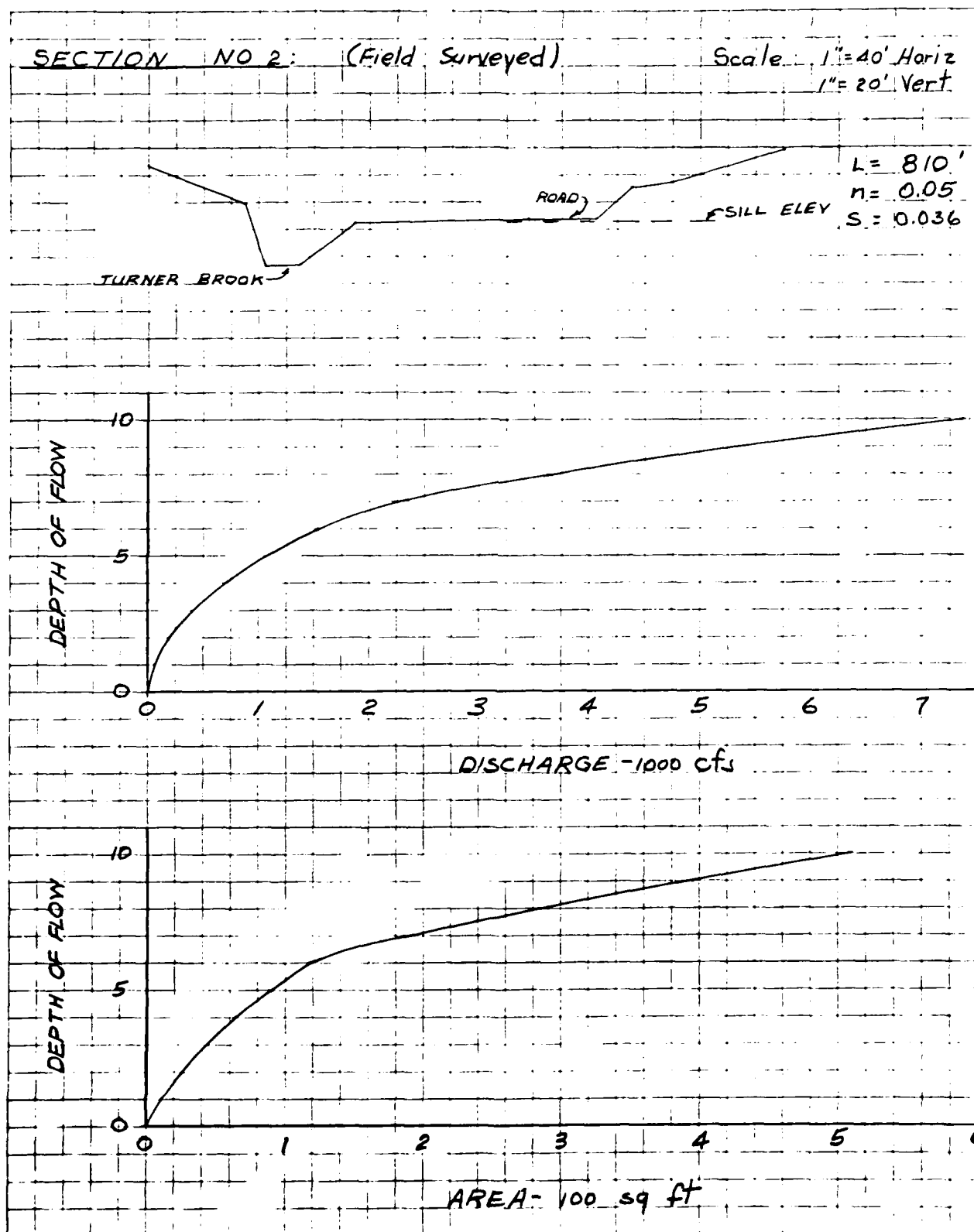
CONSULTING ENGINEERS

CKD BY D.H. DATE 5/19/80

37 Brookside Road - Waterbury, Conn. 06708

JOB NO. Q49-24

SUBJECT MYSTROM POND DAM - Flood Routing



BY SAL DATE 5/13/82 **ROALD HAESTAD, INC.** SHEET NO. 9 OF 16
CONSULTING ENGINEERS
CKD BY DL DATE 5/19/80 37 Brookside Road - Waterbury, Conn. 06708 JOB NO. 49-024
SUBJECT NYSTRAM POND DAM - Flood Routing

SECTION NUMBER 3

H	W	A	R	S	V	Q
1.0	14	7	.49	.0270	3.81	27
2.0	28	28	.99	.0270	6.05	170
3.0	43	63	1.48	.0270	7.93	500
4.0	57	112	1.98	.0270	9.61	1076
5.0	71	175	2.47	.0270	11.15	1950
6.0	79	249	3.15	.0270	13.11	3264
7.0	87	331	3.79	.0270	14.83	4916
8.0	96	421	4.40	.0270	16.39	6902
9.0	104	519	4.99	.0270	17.84	9257
10.0	112	625	5.57	.0270	19.19	11991

MANNING COEFFICIENT=N=.0400
STORAGE AT TIME OF FAILURE=S= 193 AC. FT.
LENGHT OF REACH=L= 2750 FT.

INFLOW INTO REACH=QP1= 2715 CFS
DEPTH OF FLOW=H1= 5.6 FT.
CROSS SECTIONAL AREA=A1= 219 SQ. FT.
STORAGE IN REACH=V1= 13.8 AC. FT.

TRIAL REACH OUTFLOW=QP(TRIAL)= 2520 CFS
TRIAL DEPTH OF FLOW=H(TRIAL)= 5.5 FT.
TRIAL CROSS SECTIONAL AREA=A(TRIAL)= 208 SQ. FT.
TRIAL STORAGE IN REACH=V(TRIAL)= 13.2 AC. FT.

REACH OUTFLOW=QP2= 2525 CFS
DEPTH OF FLOW=H2= 5.5 FT.

BY SAL DATE 5/9/80 **ROALD HAESTAD, INC.** SHEET NO. 10 OF 16
CONSULTING ENGINEERS
CKD BY D.A. DATE 5/11/80 37 Brookside Road - Waterbury, Conn. 06708 JOB NO. 049-24
SUBJECT MYSTROM POND DAM - Flood Routing

SECTION NO 3

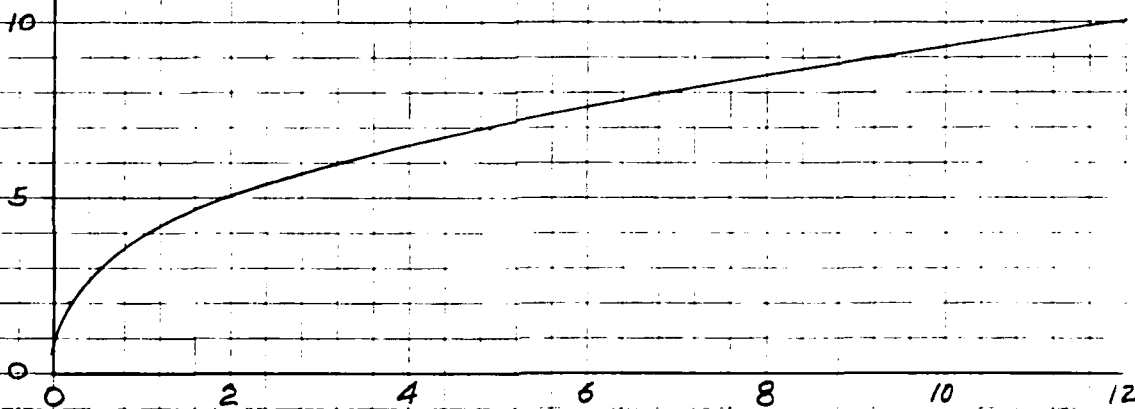
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1" = 20' Vert

$L = 2,750$ ft

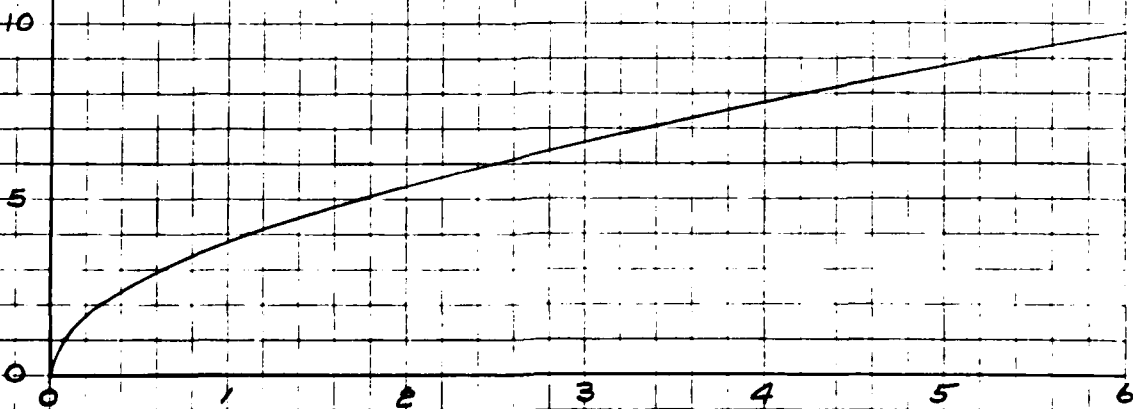
$S = 0.027$

$n = 0.04$

DEPTH OF FLOW



DEPTH OF FLOW



BY SAL DATE 5/19/80 **ROALD HAESTAD, INC.** SHEET NO 11 OF 16
CONSULTING ENGINEERS
CKD BY RS DATE 5/19/80 37 Brookside Road - Waterbury, Conn. 06708 JOB NO 49-024
SUBJECT NYSTRQM POND DAM - Flood Routing

SECTION NUMBER 4

H	W	A	R	S	V	Q
1.0	18	9	.50	.0310	4.10	37
2.0	36	36	.99	.0310	6.51	234
3.0	54	81	1.49	.0310	8.53	691
4.0	72	144	1.97	.0310	10.34	1488
5.0	91	225	2.48	.0310	11.99	2698
6.0	109	324	2.98	.0310	13.54	4388
7.0	127	441	3.48	.0310	15.01	6612
8.0	145	576	3.97	.0310	16.41	9450
9.0	163	729	4.47	.0310	17.75	12937
10.0	181	900	4.97	.0310	19.04	17134

MANNING COEFFICIENT=N=.0400
STORAGE AT TIME OF FAILURE=S= 193 AC. FT.
LENGHT OF REACH=L= 2000 FT.

INFLOW INTO REACH=QP1= 2525 CFS
DEPTH OF FLOW=H1= 4.9 FT.
CROSS SECTIONAL AREA=A1= 214 SQ. FT.
STORAGE IN REACH=V1= 9.8 AC. FT.

TRIAL REACH OUTFLOW=QP(TRIAL)= 2396 CFS
TRIAL DEPTH OF FLOW=H(TRIAL)= 4.8 FT.
TRIAL CROSS SECTIONAL AREA=A(TRIAL)= 206 SQ. FT.
TRIAL STORAGE IN REACH=V(TRIAL)= 9.5 AC. FT.

REACH OUTFLOW=QP2= 2399 CFS
DEPTH OF FLOW=H2= 4.8 FT.

BY...SAK... DATE 5/9/80

ROALD HAESTAD, INC.
CONSULTING ENGINEERS

SHEET NO...12... OF...16...

CKD BY...D.F.S. DATE 5/15/80

37 Brookside Road - Waterbury, Conn. 06708

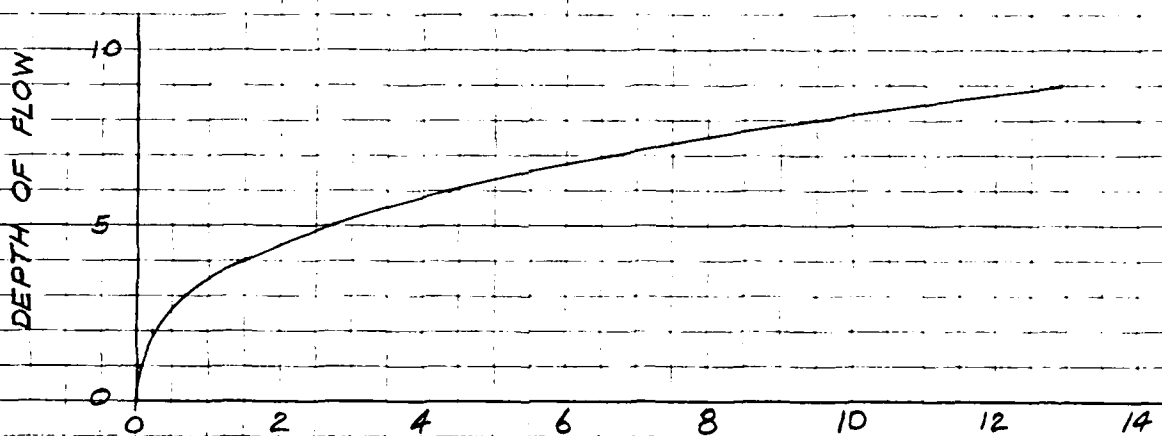
JOB NO...049-24

SUBJECT...NYSTROM POND... DAM - Flood Routing

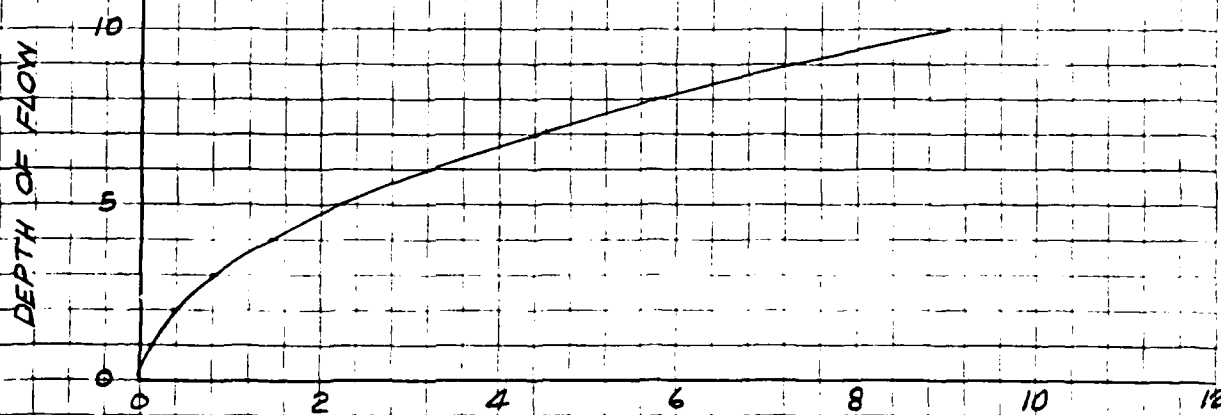
SECTION NO 4:

Scale: 1" = 50' Horiz
1" = 20' Vert

$L = 2,000$ $S = 0.031$ $n = 0.04$



DISCHARGE - 1000 cfs



AF 1-100 sq ft

BY...SA4...DATE 5/8/80... **ROALD HAESTAD, INC.** SHEET NO...13...OF 16...
CONSULTING ENGINEERS
CKD BY...DL5...DATE 5/9/80... 37 Brookside Road - Waterbury, Conn. 06708 JOB NO...049-24...
SUBJECT...NYSTROM POND DAM - Areas...

Planimeter Readings:

1) Surface Area: Third = 10.50 sq in 3.03
First = 4.38 sq in 2.98
Start = 1.40 sq in

$$\frac{3.03 \text{ in}^2 \times (500 \text{ ft})^2}{\text{in}^2} \times \frac{1 \text{ acre}}{43,560 \text{ ft}^2} = 17.4 \text{ acres}$$

2) Section No. 1:

a) Contour 690: Third = 3.76 sq in 0.74
First = 2.27 sq in 0.74
Start = 1.53 sq in

$$\frac{0.74 \text{ in}^2 \times (500 \text{ ft})^2}{\text{in}^2} \times \frac{1 \text{ acre}}{43,560 \text{ ft}^2} = 4.25 \text{ acres}$$

b) Contour 700: Third = 6.42 sq in 1.53
First = 5.37 sq in 1.53
Start = 3.84 sq in

$$\frac{1.53 \text{ in}^2 \times (500 \text{ ft})^2}{\text{in}^2} \times \frac{1 \text{ acre}}{43,560 \text{ ft}^2} = 8.78 \text{ acres}$$

3) Section No. 2:

a) Contour 690: Third = 5.18 sq in 1.11
First = 2.96 sq in 1.11
Start = 1.85 sq in

$$\frac{1.11 \text{ in}^2 \times (500 \text{ ft})^2}{\text{in}^2} \times \frac{1 \text{ acre}}{43,560 \text{ ft}^2} = 6.37 \text{ acres}$$

b) Contour 700: Third = 6.92 sq in 1.96
First = 3.00 sq in 1.96
Start = 1.04 sq in

$$\frac{1.96 \text{ in}^2 \times (500 \text{ ft})^2}{\text{in}^2} \times \frac{1 \text{ acre}}{43,560 \text{ ft}^2} = 11.25 \text{ acres}$$

BY SAL DATE 5/19/80

ROALD HAESTAD, INC.

SHEET NO 14 OF 16

CONSULTING ENGINEERS

CKD BY DA DATE 5/12/80

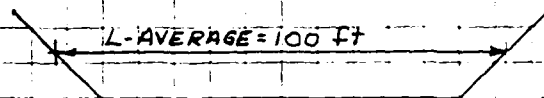
37 Brookside Road - Waterbury, Conn. 06708

JOB NO 49-02A

SUBJECT NYSTRON POND DAM - Discharge at Moosehorn Road

SECTION 1A

Scale: 1" = 40' Horiz
1" = 10' Vert



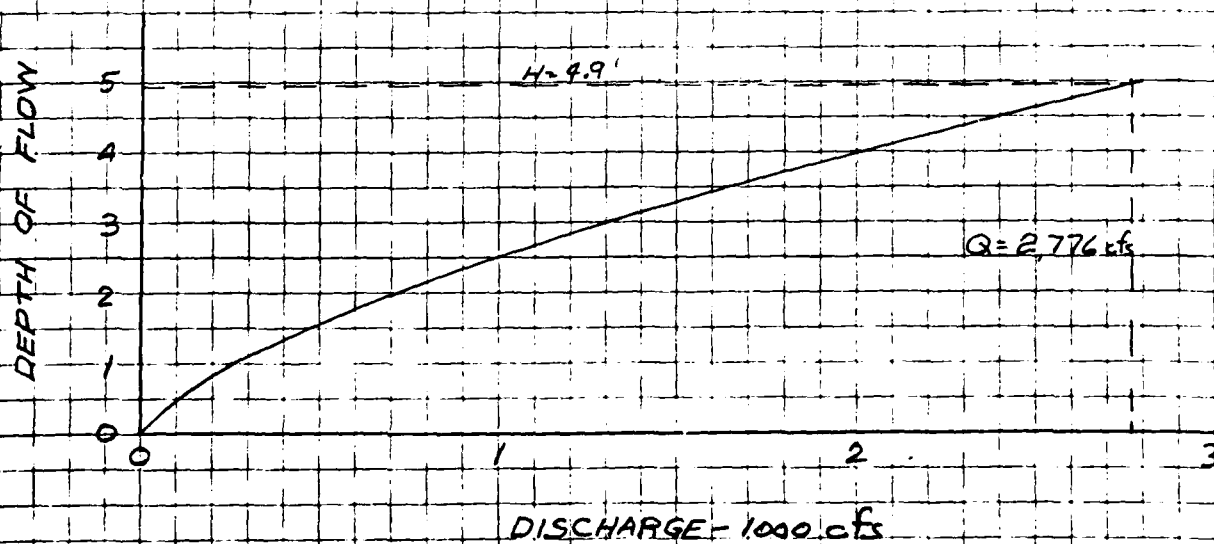
Use $Q = CLH^{3/2}$

Assume $C = 2.5$

DEPTH OF FLOW (ft)	DISCHARGE CAPACITY (cfs)
1	250
2	707
3	1,299
4	2,000
5	2,795

Q (Outflow from Section 1) = 2,776 cfs

\therefore Flow over Moosehorn Road is at a depth of 4.9 feet



BY SAL DATE 5/19/80

ROALD HAESTAD, INC.
CONSULTING ENGINEERS

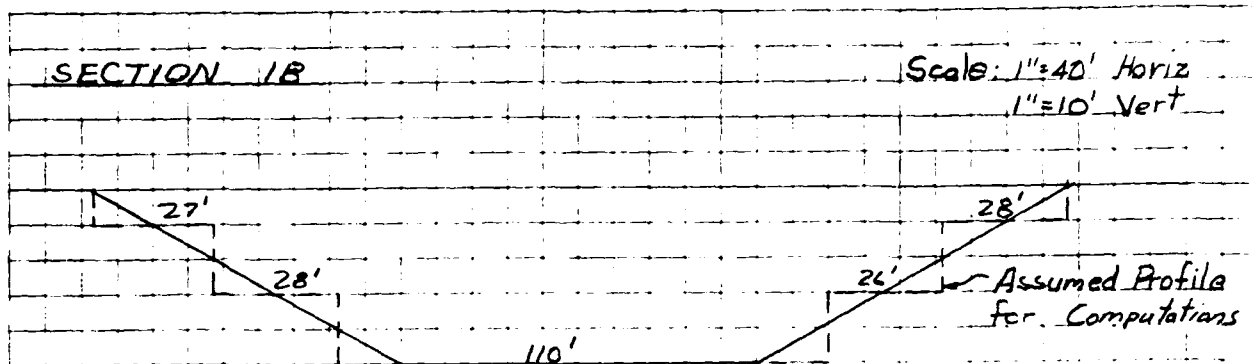
SHEET NO. 15 OF 16

CKD BY DLS DATE 5/20/80

37 Brookside Road - Waterbury, Conn. 06708

JOB NO. A9-024

SUBJECT NYS TRRM POND DAM - Discharge at Northfield Road



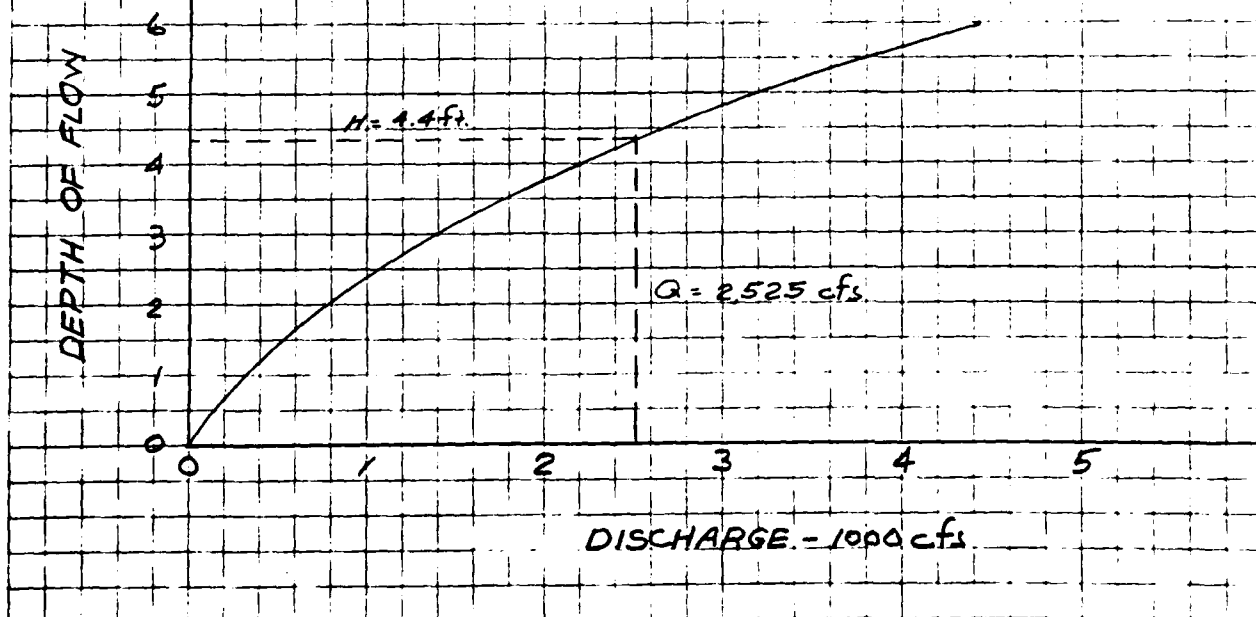
Use $Q = CLH^{3/2}$

Assume $c = 2.5$

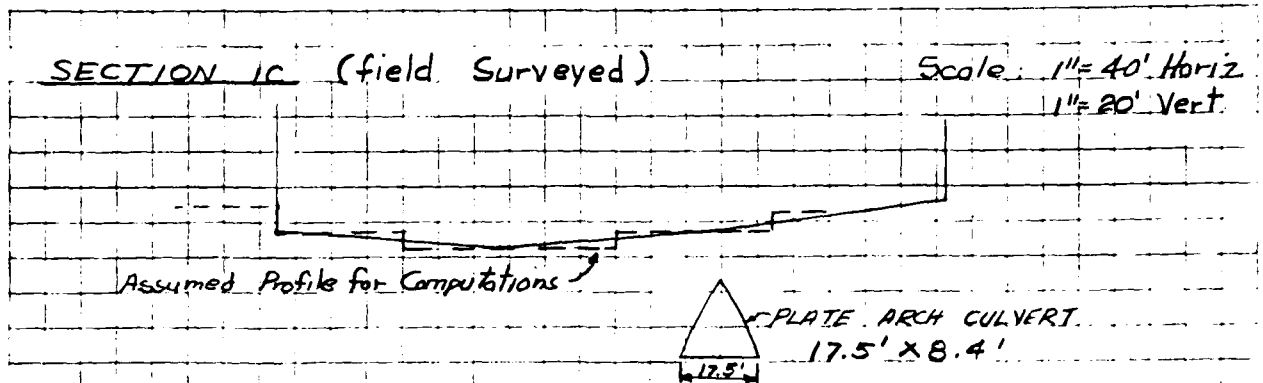
DEPTH OF FLOW (ft)	Q_1 (cfs)	Q_2 (cfs)	Q_3 (cfs)	Q_{TOTAL} (cfs)
0	0	0	0	0
2	778	0	0	778
4	2,200	0	0	2,200
6	4,042	382	0	4,424
8	6,223	1,080	0	7,303
10	8,696	1,984	389	11,069

$Q = (\text{Outflow from Section 3}) = 2,525 \text{ cfs}$

∴ Flow over Litchfield Rd. is at a depth of 4.4 ft

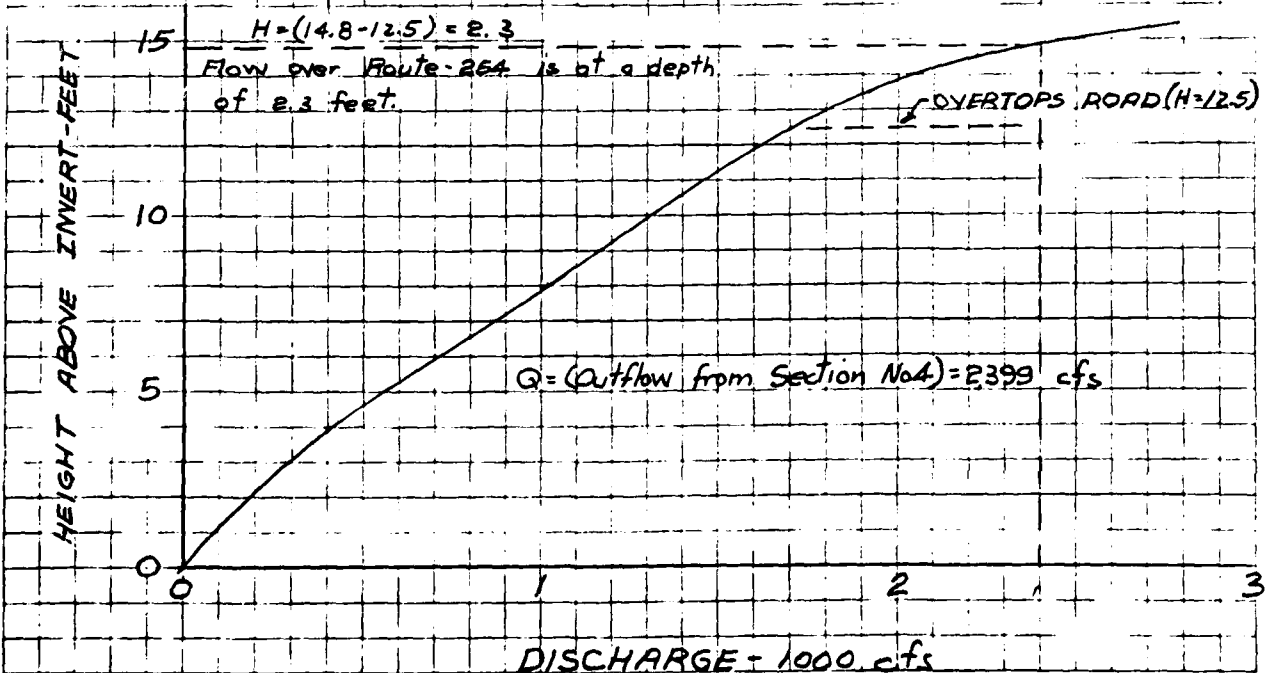


BY SAL DATE 4/14/80 **ROALD HAESTAD, INC.** SHEET NO 16 OF 16
CONSULTING ENGINEERS
CKD BY DL DATE 5/20/80 37 Brookside Road - Waterbury, Conn. 06708 JOB NO
SUBJECT N.Y.S. I.R.O.M. POND DAM - Discharge at Route - 254



Roadway Discharge use $Q = CLH^{3/2}$ $C = 2.5$
Plate Arch Culvert - Assume inlet Control and use nomograph
pg 145 in the Handbook of Steel Drainage &
Highway Construction Products.

HEIGHT ABOVE INVERT-FT	Culvert Discharge (cfs)	Route - 254 Disc. (cfs)	Q TOTAL (cfs)
4	400	0	400
8	1,020	0	1,020
12.5	1,700	0	1,700
13.5	1,800	120	1,920
14.5	1,880	339	2,219
15.5	2,000	781	2,781



BY SAL DATE 5/15/80 **ROALD HAESTAD, INC.** SHEET NO. 7 OF 16
 CONSULTING ENGINEERS
 CRD BY RS DATE 5/11/80 37 Brookside Road - Waterbury, Conn. 06706 JOB NO. 49-024
 SUBJECT NYSTROM POND DAM - Flood Routing

SECTION NUMBER 2

TOTAL

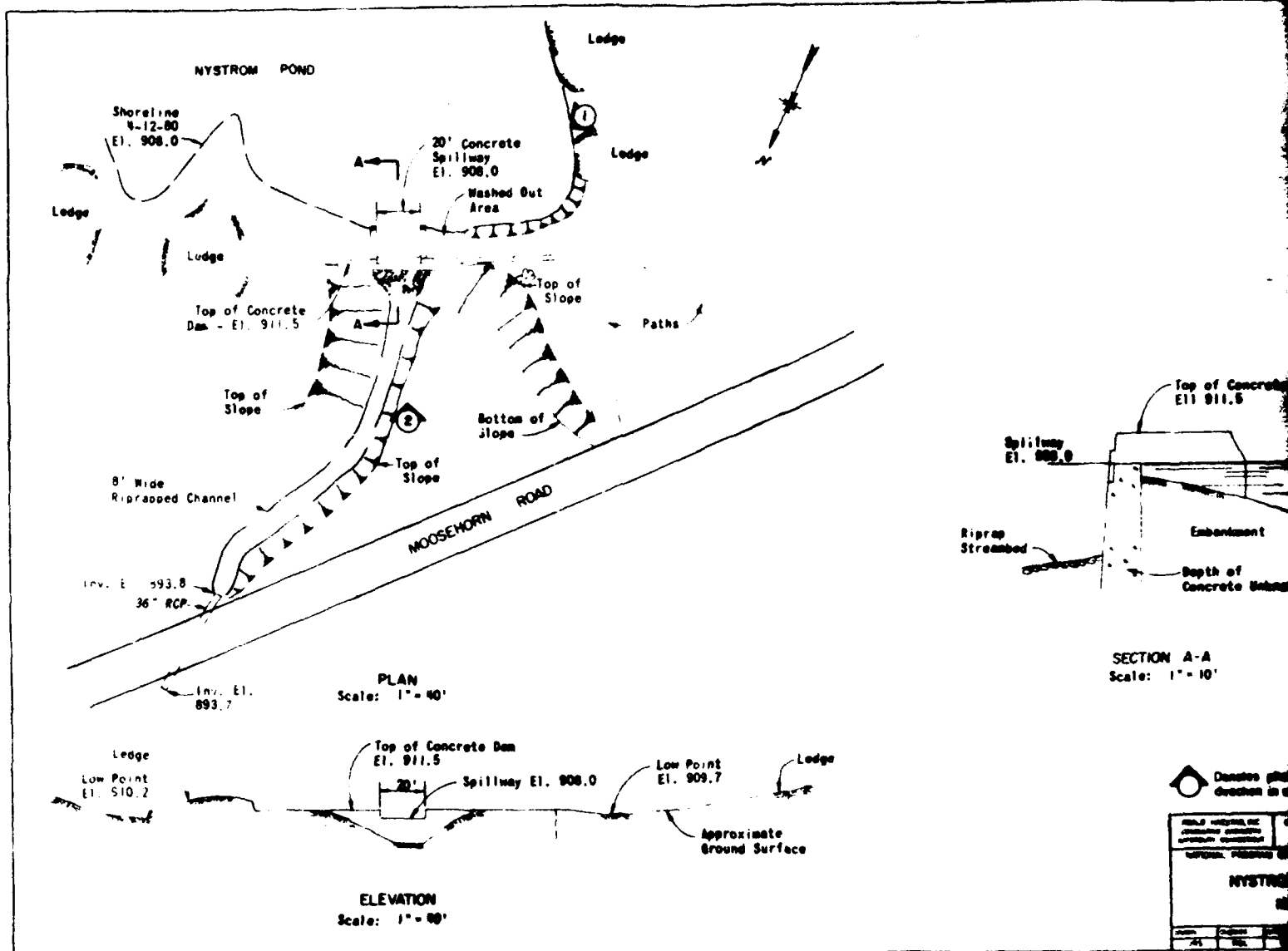
	A-1	A-2	A-T	0-1	0-2	0-T
1.0	11	0	11	51	0	53
2.0	26	0	26	185	0	185
3.0	44	0	44	393	0	393
4.0	65	0	65	682	0	682
5.0	90	0	90	1059	0	1059
6.0	118	0	118	1532	0	1532
7.0	149	39	188	2145	144	2289
8.0	180	110	290	2852	403	3255
9.0	212	184	396	3510	1932	5442
10.0	249	260	508	4190	58	7358

STORAGE AT TIME OF FAILURE=S= 193 AC. FT.
 LENGTH OF REACH=L= 810 FT.

INFLOW INTO REACH=Q_{P1}= 2776 CFS
 DEPTH OF FLOW=H₁= 7.4 FT.
 CROSS SECTIONAL AREA=A₁= 229 SQ. FT.
 STORAGE IN REACH=V= 4.3 AC. FT.

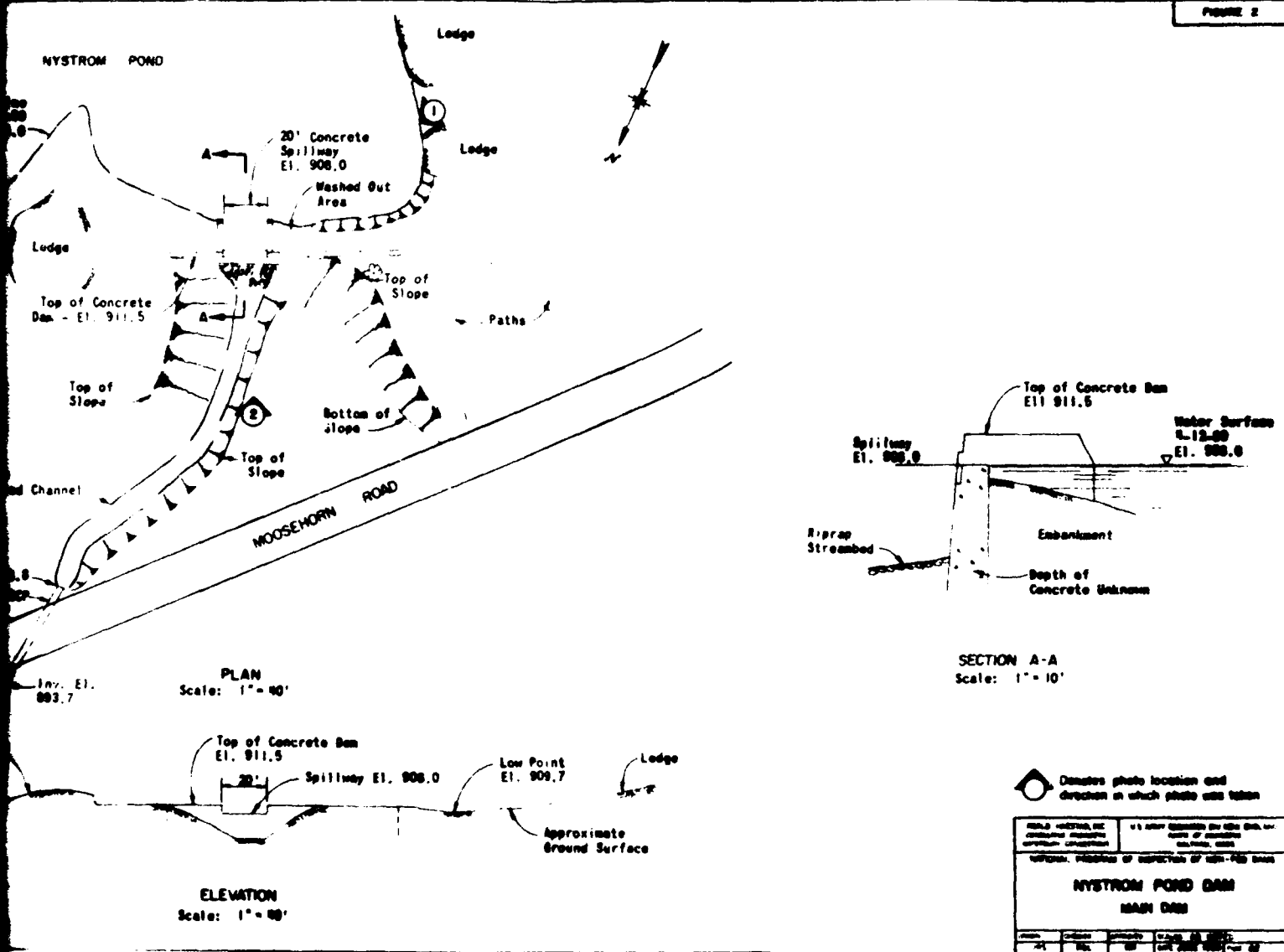
TRIAL REACH OUTFLOW=Q_P(TRIAL)= 2715 CFS
 TRIAL DEPTH OF FLOW=H(TRIAL)= 7.4 FT.
 TRIAL CROSS SECTIONAL AREA=A(TRIAL)= 224 SQ. FT.
 TRIAL STORAGE IN REACH=V(TRIAL)= 4.2 AC. FT.

REACH OUTFLOW=Q_{P2}= 2715 CFS
 DEPTH OF FLOW=H₂= 7.4 FT.



①

FIGURE 2



2